Utilization of

Meadow Crops as Silage

Bulletin 218
of the Agricultural Extension Service
Ohio State University

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Reprinted June, 1942

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Utilization of Meadow Crops as Silage

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Crops Which May Be Successfully Ensiled

Among the crops which may be successfully ensiled are the legumes such as alfalfa, clover, and soybeans; the grasses, such as timothy, orchard grass, and sudan grass; the cereals, such as corn, wheat, and oats; and mixtures of these crops. There is often an excess of pasture produced in May, which can be saved at the proper stage by putting the excess in the silo. The greater flexibility of the cropping systems and the more complete and certain utilization of meadow and pasture crops made possible by ensiling them makes the method worthy of serious study and careful attention by Ohio farmers.

Advantages of Silage from Alfalfa, Clover, Timothy, and Other Meadow Crops

1. Ensiling overcomes many uncertainties of the hay harvest. Harvesting can be done at the most favorable time, with less regard to the weather. Large losses in adverse weather, common with first cutting alfalfa, clover, and other forages in wet Junes, are prevented. Even in normal weather, losses in hay harvest from leaf shattering, bleaching, and respiration are probably equal to those in making silage.

2. Good soil improvement and conservation practices often require less frequent plowing and cultivation and greater acreages of sod crops in the rotation. Corn silage may be largely replaced by meadow crop silage. It constitutes a big step toward grassland farming.

3. More carotene is preserved in good silage than in hay made from the same forage. Feeding the meadow crop silage results in better animal nutrition and in more vitamin A in the dairy products.

4. Meadow crop silage can be used as a pasture supplement, by filling the silo in May or June and using this silage in the summer. The silo may again be filled in the fall, thus permitting double use of the silo.

5. Ensiling is a way to handle coarse stemmy legumes and weedy or damaged crops of legume hay or small cereals. Ensiling does not make good feed out of poor forage, but the silage may be more readily eaten than the hay from such a crop.

6. Silage requires about one-third as much storage space as long hay for an equal amount of dry matter.

7. The fire hazard of silage is negligible.

8. Silage, not being dusty, makes for cleaner barns at feeding time.

[1] This is the fourth revised edition of an Ohio Agricultural Extension Service circular on this topic. The first three editions were issued as mimeographs in June of 1938, 1939, and 1940. The present edition has been prepared in cooperation with investigators associated in the silage research project of the Ohio Agricultural Experiment Station.

Difficulties and Objections

1. More labor and mechanical power are required to handle the same crop green than dry.

2. Obtaining preservatives may involve cash outlays.

3. Grass silage frequently may develop high silage pressures; hence it may be necessary to reinforce many existing silos.

4. It is difficult to control the moisture content of the material.

Methods of Preserving Meadow Crop Silage

Ensiling without any preservative.—If the material is of the proper dry matter content, it can be made into good silage without any treatment other than careful packing. The proper dry matter content for best results, as determined in experiments, is about 25 to 40 per cent dry matter (75 to 60 per cent moisture) in the material as it goes into the silo. However, these percentages are hard to determine and harder to control, so that in practice attempts at making silage of alfalfa or other pure legumes without preservatives may be unsatisfactory. With the development of rapid, simple, and accurate methods of determining moisture in forages (13, 14)*, ensiling without preservatives may be expected to increase in importance and safety.

Crop mixtures.—Alfalfa, soybeans, and other legumes can be mixed with green corn, sorghum, wheat, or other grasses and the resulting silage will keep without preservatives if of proper dry matter content. Corn-soybean silage is an outstanding example. Third-cutting alfalfa and corn may so be preserved. In such combinations the non-legume should probably make up one-third to one-half of the mixture. Crop mixtures may be grown together or mixed at the cutter; putting in a load of one and then of the other is not satisfactory.

Ground corn.—In the early Kansas experiments (1) the addition of 10 per cent by weight of coarsely ground shelled corn resulted in good alfalfa silage. This method is being tried again, but critical data as to its value are lacking. Recent work suggests that the addition of 100 to 250 pounds of corn meal or corn and cob meal per ton of green material may have a favorable effect on quality especially if the material is too low in dry matter. Some Ohio farmers have reported good results by using this method (11).

Molasses method.—This is now the most commonly used method. Molasses, like the sugar naturally present in corn silage, ferments to lactic and acetic acids, which preserves the silage. An excess of molasses does not harm, but adds a little to the feeding value and may add to the palatability of the silage. Molasses is somewhat difficult and "messy" to handle. Either cane or beet molasses can be used. It weighs from 11 to 12 pounds to the gallon.

Phosphoric acid method.—This method utilizes phosphoric acid. Longer time experiments will be required to determine the relative success of this

* See "References" on page 8.

method and the feeding value of the silages so made. Phosphoric acid frequently tends to reduce the palatability of meadow-crop silage. It adds to the phosphorus content of the feed; much of the phosphoric acid is recoverable in the manure, and is valuable as a fertilizer. Phosphoric acid is corrosive, but is easier and cleaner to handle than molasses. This phosphoric acid is not the fertilizer, superphosphate, formerly called "acid phosphate." It is a special grade, essentially free from fluorine, especially prepared for use in silage.

How to Put Up Silage from Meadow Crops

Time of cutting.—Cut at the proper time to make *good* hay. This is earlier than the average time of cutting hay in Ohio. For detailed suggestions on time of cutting, consult "When and How in Haymaking," Ohio Agricultural Extension Service Bulletin 160. Especially where large acreages are to be preserved, some forage must be cut early in order that the last material put up may be of good quality. Although over-mature forage can be made into silage, and possibly fed with less waste than the corresponding hay, the big advantage of silage lies in making it possible to harvest forage at the most desirable stage with minimum interference from the weather. In order that the forage may not get too dry, do not mow more at one time than can be put up in a half day.

Should meadow crops for silage be allowed to dry at all before ensiling? An important factor in making good meadow crop silage is the moisture content of the material. If it is too dry, it will not pack well and hence will mold and spoil; if it is too wet there will be considerable drainage of juice pressed from the silage, or, if part of the silo is below ground and tight, the silage in the lower part will be of low quality. For this reason, the recommendation frequently made, to rush material to the silo as rapidly as possible, is not always safe.

The desirable dry matter content is 25 to 40 per cent (75 to 60 per cent moisture). Material having less than 25 per cent of dry matter will lose considerable amounts of juice, containing valuable nutrients, and may develop undesirable fermentations. Alfalfa and other forages in the early stages of maturity may contain only 15 to 25 per cent of dry matter when standing, and if not allowed to dry at all, and especially if wet with dew or rain, they may arrive at the silo with very high moisture contents. Such materials should dry slightly in the field before ensiling. Lying for 2 to 4 hours after cutting on good drying days will be sufficient to reduce the moisture content within the 60 to 70 per cent range. On the other hand, material which had dried below 60 per cent moisture may not make good silage because of the practical difficulty of packing such dry silage so as to exclude air.

Loading and transporting.—The crop may be loaded directly from the swath, although it is usually better practice to windrow it. This can be done by either a slatted windrower attached to the cutterbar of the mower or by a side-delivery rake. Cutterbar windrowers do not work well on

hillsides. The side-delivery rake can be attached to a power mower, thereby eliminating an operation. When using a side-delivery rake the teeth should be set just low enough to turn all the material, but not so low as to roll stones into the windrow.

Loading can be done with the hayloader. The older types of cylinder hayloaders should be reinforced by replacing the ropes with No. 3 welded link chain and by replacing the slats with heavier hardwood slats.

In order to facilitate unloading, the green material may be loaded in tiers, from the front to the back of the wagon or truck, rather than in layers. Ropes, strings, and other devices can be arranged to unload the green material quickly. Dump trucks are a great aid to efficient unloading.

Cutting.—To reduce lifting, it is well to lower the silage cutter as much as possible by setting it or its truck wheels in a trench. The delivery pipe of the cutter should be set *vertical* to avoid plugging and to reduce power requirements. For most conditions, the length of cut should be approximately ½ inch. If the material is very high in moisture, it may be well to cut it a little longer, and if fairly dry, to cut a little shorter, than ½ inch (see page 4).

Using molasses as a preservative.—The following schedule of amounts is recommended:

Crop	Molasses per Ton of Green Forage
Grasses or cereals	0–20 pounds (0–2 gallons)
Mixed grasses and legumes	0–20 pounds (0–2 gallons)
Alfalfa or clovers	40–50 pounds (4–4½ gallons)
Soybeans	50–60 pounds (4½–5 gallons)

The lower quantities of molasses suggested can be used when the material contains the correct percentages of dry matter. The high quantities may serve as insurance when the dry matter content is either too high or too low.

Molasses may be applied by means of a pump or by gravity. It may be applied: (a) at points above the feed rolls; (b) at the bottom of the blower housing; or (c) at the upper end of the delivery pipe. Delivering the molasses at the outlet of the delivery pipe has the advantage of keeping the blower clean and facilitating elevation to some extent. A pump attached to and driven by the cutter is very satisfactory for pumping the molasses either to the top of the delivery pipe or direct to the cuttter. A regulating valve should be connected to the upper feed roll in order to regulate the amount of molasses as the amount of material being cut varies.

The pipe from the pump to the end of the delivery pipe should be at least 1 inch in size in order to reduce friction. A nozzle located at the end of the goose-neck will distribute the molasses evenly.

Using phosphoric acid as a preservative.—It is recommended that 14 to 16 pounds of 75 per cent acid be added to each ton of green legume. These quantities are small amounts to distribute uniformly over a ton of material; it is best to dilute the acid with three or four times as much water

and apply as described for molasses. While the phosphoric acid is but slowly corrosive, the equipment should be washed immediately after use.

Packing the silage.—General experience indicates that it is *essential* to distribute meadow crop silage uniformly during the filling operation, keeping the material next to the wall level or slightly higher than at the center. It probably is not necessary to tramp the silage excepting to see that the top is carefully leveled and well packed whenever cutting is stopped for any appreciable time.

Sealing the silo.—Silage will spoil at the top unless sealed, hence sealing after filling is completed is desirable unless feeding is to commence at once. The top should be leveled after filling, well tramped at intervals for four days, and water added if necessary to make the material pack well. Chopped green weeds or other low grade material can be put in on top of the silage, and save much or all of the more valuable material from spoiling.

A better seal can be made by laying roofing paper on top of the leveled and tramped silage, lapping the layers 2 to 3 inches. Strong wrapping paper, oiled with lubricating oil, has been successfully substituted for the more expensive roofing paper. Then any material available, such as sawdust, chopped weeds, or wet cut straw, is placed on top of the paper. The seal must be cheap, or merely tramping the top of the silage well and using sufficient water will be more economical.

References on Grass and Legume Silage

As the making of silages from meadow and pasture grasses and legumes has only recently attained importance in practice, some readers of this bulletin may wish to refer to other and more extensive reports of experiments and practices. Hence the following list of significant publications:

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14. Parks, R. Q. A Rapid and Simple Method for Determining Moisture in Forages and Grains. Journal American Society of Agronomy, Vol. 33, pp. 325-335. 1941.

The Ohio State University and
United States Dept. of Agriculture,
Cooperating

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Agricultural Extension Service,
H. C. Ramsower, Director,
Columbus, Ohio

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Printed and distributed in furtherance of
Acts of May 8 and June 30, 1914